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CRACK PATTERN FINISHING METHOD
[Kurakku Moyo Shiage Hoho]

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Specification

1. Title of the invention

Crack Pattern Finishing Method

2. Claim

A crack pattern finishing method, characterized by the fact that after adjusting the base of an object to be coated, that is, after coating a primer, a vinyl chloride resin group paint is coated; a vinyl chloride resin group paint with a different hue containing silicon dioxide and/or aqueous amorphous silicon dioxide with an amount of oil absorption (mL/100 g) of 100 or more in a wet-on-wet state at 15-50 parts by weight to the resin at 100 parts by weight is coated; and a clear is coated.

3. Detailed explanation of the invention

The present invention pertains to a crack pattern finishing method and is a pattern finishing method that coats a vinyl chloride resin group paint containing silicon

[1] Numbers in the margin indicate pagination in the foreign text.

dioxide and/or aqueous amorphous silicon dioxide in a wet-on-wet state, exposes a crack pattern with a characteristic, and further coats a clear, so that a long-term coated film performance can be maintained as an external coating finish.

A cracking lacquer in which the amount of resin is reduced and a large amount of metal powder such as aluminum stearate is mixed to obtain a coating surface with a crack pattern has been provided. However, in the cracking lacquer, since the strength of a coated film and the adhesion to the base were considerably inferior as limitations due to its mixture composition, the long-term coated film performances were inferior, and the cracking lacquer could not be utilized as an external finish for a pattern coating of buildings. Also, there were many relative small cracks in the crack pattern itself, and the decorative effect was deficient.

These inventors considered the above-mentioned situation and reviewed the crack pattern coating with excellent long-term coated film performances. As a result, it was discovered that if a mixture in which a specific amount of mixture of silicon dioxide and/or aqueous amorphous silicon dioxide with an amount of oil absorption (mL/100 g, hereinafter, the same) of 100 or more was

included in a vinyl chloride resin paint was coated in a wet-on-wet state and a clear was further coated, a crack pattern with excellent long-term weather resistance could

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be obtained. In other words, the present invention pertains to a crack pattern finishing method characterized by the fact that after adjusting the base of an object to be coated, that is, after coating a primer, a vinyl chloride resin group paint is coated; a vinyl chloride resin group paint with a different hue containing silicon dioxide and/or aqueous amorphous silicon dioxide with an amount of oil absorption (mL/100 g) of 100 or more in a wet-on-wet state at 15-50 parts by weight to the resin at 100 parts by weight is coated; and a clear is coated.

The object to be coated in the present invention includes buildings made of concretes, mortars, slates, PC plates, wood parts, or general iron parts. In the base adjustment of the object to be coated, soil and sand, oil, stains, etc., attached to the surface are completely removed from concrete, etc., and pH of the surface is set to 10 or less. Also, in the iron parts, [illegible] of the surface is completely dropped. Thus, if necessary, a primer is coated on the object to be coated in which the base has been adjusted.

A vinyl chloride resin group paint is coated on the above-mentioned object by a well-known coating method such as roller coating, spray coating, or brush coating. Then, while the coated film is in a non-dried state (within the finger contact dryness), a vinyl chloride resin paint with a different hue is coated in a so-called wet-on-wet state.

The vinyl chloride resin group paint is a conventional well-known solution type paint and is a copolymer of vinyl chloride and vinyl acetate, vinylidene chloride, acrylic ester, and vinyl propionate. It is obtained by mixing pigments, extenders, and additives for paints. Then, the characteristic of the present invention is that a paint containing silicon dioxide and/or aqueous amorphous silicon dioxide with an amount of oil absorption of 100 or more at 15-50 parts by weight to the resin at 100 parts by weight is used as the vinyl chloride resin group paint with a different hue. If the amount of mixture is smaller than 15 parts by weight, a desired crack pattern cannot be obtained. On the contrary, if the amount of mixture is more than 50 parts by weight, the viscosity is raised, the coating is difficult, and the coated film performances are inferior and impractical. Also, if the amount of oil absorption of the silicon dioxide and aqueous amorphous silicon dioxide is lower than 100, the coated film

performances cannot b maintained in a range of a specific amount of mixture, and the crack pattern as the feature of the present invention cannot be obtained. Thus, as appropriate trade names on the market, for example, Aerosil 200 (made by Nippon Aerosil K.K., an amount of oil absorption of about 140-180) and Aerosil TT-600 (made by Nippon Aerosil K.K., an amount of oil absorption of about 100-115) as the silicon dioxide and Cyloid 244 (made by Fuji Davision Chemical Co., Ltd., an amount of oil absorption of about 270-880), Cyloid 978 (made by Fuji Davision Chemical Co., Ltd., an amount of oil absorption of about 180-280), Cyloid 161 (made by Fuji Davision Chemical Co., Ltd., an amount of oil absorption of about 125-185), Mizucasil P-526 (Mizuzawa Kagaku Kogyo K.K., an amount of oil absorption of about 240-280), Caprex 67 (made by Shionogi & Co., Ltd., a trade name, an amount of oil absorption of about 145-185), and Tokusil GO-N (made by Tokuyama Soda K.K., an amount of oil absorption of about 280-280) as the aqueous amorphous silicon dioxide are mentioned.

The vinyl chloride resin group paint with a different hue is coated in a wet-on-wet state, and as its coating method, any of roller coating, spray coating, and brush coating can be applied. The coated film thickness is

usually in a range of 20-200 μ. As the film thickness is thickened, the shape of cracks becomes large. Especially, in the roller coating and the spray coating, if the film thickness is about 100, the size of the pattern is distinct, and a pattern with excellent sense of projections and recessions is attained.

In the present invention, the crack pattern is different in accordance with the coating methods, and various patterns can be selected. In the brush coating, a thread-shaped crack pattern is formed along brush hairs, and for example, if the brush hairs are drawn in a circular shape, a crack pattern with an age shape of wood is formed. Also, in the roller coating or spray coating, there is an aluminum die cast-shaped finish as a finish of a multilayer pattern spraying material of buildings, and the crack pattern with a sensor of recessions and projections can be obtained. The coating method can be selected from these crack patterns in accordance with the purposes.

The vinyl chloride resin group paint being in the present invention is also currently used as a paint for construction, and a specific amount of mixture of silicon dioxide and aqueous amorphous silicon dioxide with an amount of oil absorption of 100 or more is included in a

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range where its coated film performances are not damaged. There is no problem in the coated film performances of the crack pattern obtained. Also, in the present invention, the crack pattern cannot be obtained unless coating is applied in a wet-on-wet state.

In the present invention, the vinyl chloride resin group paint is coated in a wet-on-wet state, the crack pattern with a feature is exposed, and the clear is further coated. With the coating of the clear, the long-term coated film performances of the crack pattern coated film can be improved, and the crack pattern can be utilized as a finishing pattern for external facing of buildings. Also, if the clear in which a well-known ultraviolet absorbent is included at 0.1-5 parts by weight is coated, an especially excellent effect as a finishing pattern for external facing is exerted. As the clear, there is no particular limitation as long as the topcoating suitability with the vinyl chloride resin group paint is excellent and the adhesion is excellent, and vinyl chloride resin, acrylic resin, epoxy resin, etc., are mentioned. Also, the clear is coated by brush coating, roller coating, and spray coating.

The crack pattern finishing method of the present invention can be especially recommended as a pattern finishing for internal and external facing of buildings.

Next, the present invention is explained by application examples and comparative examples. Part means part by weight.

Application Example 1

After cleaning the surface by wiping sand and soil, oil, and stains of a concrete surface with a cloth, a vinyl chloride resin group primer was coated at a ratio of an amount of coating of 110 g/m^2 by a roller brush on the market. After a lapse of 5 h of coating, a vinyl chloride resin paint (white)*1 was coated at a dry film thickness of 30 μ by a roller coating, and in a wet state (1 h after coating) in which the coated film surface was not completely cured after coating), a vinyl chloride resin paint (yellow)*2 was coated at a dry film thickness of 100 μ and held at normal temperature for 24 h. Furthermore, a vinyl chloride resin paint clear*3 was coated at a thickness of 30 μ by a spray coating. In the crack pattern obtained, large cracks with a pattern having a sensor of projections and recessions was obtained. Its coated film performances were investigated. The test results are shown in Table 1.

*1 Mixture composition	Part
45% vinyl chloride-vinyl propionate copolymer solution (vinyl chloride/vinyl propionate = 70/30)	55
Titanium white	22
Anti-settling agent	1.5
Dispersion stabilizer	0.5
Plasticizer	2
Light stabilizer	4
Toluene	11
Methyl isobutyl ketone	2
	98

The above-mentioned mixture composition was adjusted to a coating viscosity of 50 Ku value and coated by the roller coating.

*2 Mixture composition	Part
45% vinyl chloride-vinyl propionate copolymer solution (vinyl chloride/vinyl propionate = 70/30)	65
Oxide yellow	8
Mizucasil P-526	10
Plasticizer	2.5
Anti-settling agent	2
Dispersion stabilizer	0.5
Light stabilizer	2.5
Toluene	10

Methyl isobutyl ketone	2
	102.5

The above-mentioned mixture composition was adjusted to a coating viscosity of 50 Ku value and coated by the roller coating.

*3 Mixture composition

50% vinyl chloride-vinyl propionate copolymer solution

Application Example 2

The amount of mixture of Mizucasil P-526 being included in the vinyl chloride resin paint (yellow) in Application Example 1 was set to 3 parts, 5 parts, 13 parts, and 15 parts and coated while adjusting the coating viscosity to 50 Ku value. In the case where the amount of mixture was 3 parts, no crack pattern was generated. Also, in the case where the amount of mixture was 15 parts, the viscosity was considerably raised when the paint was adjusted, and the manufacture was difficult. Furthermore, even if this mixture was coated, the coated film performances were inferior.

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In the case where the amount of mixture was 5 parts and 13 parts, good crack patterns could be obtained similarly to Application Example 1. The coated film performance test results are shown in Table 1.

Application Example 3

After dropping rusts of a steel plate by a sandpaper, oil stains were wiped with a thinner, so that the surface was cleaned. Next, a shop primer was coated at a dry film thickness of 5 μ by a spray coating. Then, a vinyl chloride resin paint (green)*4 was coated at a dry film thickness of 80 μ by a brush coating, and after a lapse of 1 h of coating, a vinyl chloride resin paint (black)*5 was coated at a dry film thickness of 60 μ in a circular shape by a brush. Then, it was held at normal temperature for 24 h. Next, an acrylic resin paint clear*6 was coated at a thickness of 80 μ by a spray coating. The crack pattern obtained was a crack pattern with an age-shaped feature. The test results of its coated film performances are shown in Table 1.

*4 Mixture composition	Part
50% vinyl chloride-vinyl acetate copolymer solution (vinyl chloride/vinyl acetate = 75/25)	70
Titanium white	1
Cyanine green	5
Anti-settling agent	8
Dispersion stabilizer	1
Plasticizer	8
Light stabilizer	8

	Toluene	10
	Methyl isobutyl ketone	2
		98
*5	Mixture composition	Part
	50% vinyl chloride-vinyl acetate copolymer solution	
	(vinyl chloride/vinyl acetate = 75/25)	60
	Carbon black	2.5
	Erosil	10
	Anti-settling agent	8
	Dispersion stabilizer	1
	Plasticizer	2.5
	Light stabilizer	1
	Toluene	10
	Methyl isobutyl ketone	2
		82
*6	Mixture composition	
	20% cellulose acetate butyrate	90
	50% acrylic acid resin solution	60
	50% alkyd resin solution	10
	Dispersant	2
		162

Comparative Example 1

In Application Example 1, instead of the vinyl chloride resin paint (white) and the vinyl chloride resin

paint (yellow), a Viny paint (white)*5 and a Vinyl paint (yellow)*6 were coated similarly to Application Example 1, however an intended crack pattern could not be obtained.

*5 Viny paint (white): made by Kansai Paint Co., Ltd. vinyl acetate-vinyl chloride group emulsion paint, trade name

*6 Viny paint (yellow): (made by Kansai Paint Co., Ltd., vinyl acetate-vinyl chloride group emulsion paint, trade name) Mizucasil P-526 was added at 20 pats, 40 parts, and 60 parts to the resin at 100 parts by weight and provided. In the case where the mixture was added at 60 parts by weight, the viscosity was considerably raised, and the paint could not be coated.

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Table 1

1. Test item
2. Amount added
3. Application Example 1
4. Application Example 2
5. Application Example 3
6. 3 parts
7. 5 parts
8. 13 parts
9. 15 parts

10. Weather resistance (exposure for 12 months)

11. Adhesion

12. After coating

13. Exposure for 12 months

14. Yellowness

15. Water resistance

16. Within 1 month

17. 12 months or more

試験項目 / 実施例	実施例1	実施例2				実施例3
		3部	5部	13部	15部	
耐候性（12カ月ばくろ）	○	○	○	○	×	○
付着性 乾燥後	○	○	○	○	○	○
付着性 ばくろ12カ月	○	○	○	○	×	○
黄変性	1カ月以内	1カ月以内	1カ月以内	1カ月以内	1カ月以内	12カ月以上
耐水性	○	○	○	○	○	○

Weather resistance: The coated surface state after exposing was decided by an outdoor exposure.

Adhesion: A gum tape was well pressed against the coated surface and peeled off, and whether or not the coated film was peeled off was decided.

Yellowness: The yellowness of the clear coated film was investigated by the exposure.

Water resistance: After immersing the coated film for 1 month into water (20°C), whether or not peeling-off of the coated film, swelling of the coated surface, and the decolorization were caused was decided.